

Jerky Making: then and now

M.J. Marchello

Ph.D., Professor, Animal and Range Sciences

Julie Garden-Robinson

Ph.D., L.R.D., Food and Nutrition Specialist

Jerky is a nutrient-dense, convenient and shelf-stable meat product that has grown in popularity world wide. Derived from the Spanish word "charqui," which describes dried meat strips, jerky may be produced using a combination of curing, smoking and drying procedures.

Traditionally jerky was made by the use of sun, wind, and smoke from fires as a way to preserve and extend the shelf-life of meat. American Indians mixed berries or suet with the pounded dried meat to make pemmican. Today it is produced from either thin strips of meat (beef, pork, lamb, venison, poultry) or ground and formed meat. Many varieties of commercial seasonings are available for home use as a one-step procedure.

NDSU
Extension Service

North Dakota State University, Fargo, ND 58108

June 2010

Food Safety Issues

Homemade jerky may contain bacteria that can cause severe illness and in some cases even death

Over the centuries drying has been considered one of the ways to keep meats available for consumption. With the advent of refrigeration drying declined as a means of preservation. More recently there has been a renewed interest in dried meat products but with less salt, cure, and flavorings. With these changes we have seen a number of cases of foodborne illness linked to jerky.

In February 1995, 93 people in New Mexico were diagnosed with salmonellosis. The plant's processing procedure consisted of drying partially frozen beef strips three hours at 140 F then holding at 115 F for 19 hours.

In November 1995, 11 people in Oregon were infected with *E. coli* O157:H7 in homemade venison jerky. This jerky had reportedly been dried at 125 F to 135 F for 12 to 18 hours.

These illnesses have raised concern about the safety of traditional drying methods for making jerky at home. Homemade jerky may contain bacteria that can cause severe illness and in some cases even death. The USDA currently recommends that meat be heated to 160 F before the dehydrating process in order to destroy pathogenic microorganisms.

There are special considerations when making homemade jerky from venison or other wild game. Venison can become heavily contaminated with fecal bacteria, depending on the skill of the hunter in dressing the animal and location of the wound. Fresh beef carcasses are usually rapidly chilled, but deer carcasses often are held at temperatures that could potentially allow bacteria to multiply.

Several universities have done experiments on survival of bacteria during drying. The general conclusion is that the product needs to be heated prior to drying and that adding cure (sodium nitrite) to the formulation increases the destruction of bacteria compared with jerky without added cure. Due to these safety concerns, the University of Georgia recommends that ground meat be precooked to 160 F prior to drying.

When making whole muscle jerky, there have been various recommendations. Oregon State University recommends precooking the sliced meat in a marinade prior to drying.

The University of Wyoming currently only recommends Hot Pickle Cure jerky due to safety reasons.



Oregon State University and University of Wyoming recipes are found on back page

Food Safety Guidelines

Bacteria can spread through a work area and contaminate equipment and work surfaces. To reduce your risk of foodborne illness:

- Wash your hands for at least 20 seconds with soap and water before beginning to work and after changing tasks or after doing anything that could contaminate your hands, such as sneezing or using the bathroom.
- Start with clean equipment and clean it thoroughly after using. Be sure all surfaces that come into contact with meat are clean.
- Sanitize surfaces with a solution of 1 tablespoon chlorine bleach per gallon of water. Allow to air dry.
- If using frozen meat, thaw it in a refrigerator (at 40 F or below) on the lowest shelf to avoid dripping of juices on ready-to-eat foods. Never thaw meat on the kitchen counter.
- Use refrigerated ground meat within two days or whole red meats within three to five days.
- Keep raw meat separate from other foods.
- Marinate raw meat in the refrigerator.
- Dry meats in a food dehydrator that has an adjustable temperature dial and will maintain a safe temperature for drying. Don't rely on the dial settings when using a food dehydrator. Measure the temperature of the dehydrator during processing with a calibrated thermometer; place the metal stem of a dial thermometer between dehydrator trays or create an opening for the stem by drilling a hole through the side of the tray.

Recent research at the University of Wisconsin demonstrated that even though lower dehydrator temperatures/longer times are effective at killing bacteria, a dehydrator temperature of at least 145 F is recommended.

Drying Temperature*	Minimum Drying Time	* Source: <i>Wisconsin Cooperative Extension Service. Meat and Animal Science Department. University of Wisconsin – Madison</i>
125 F 135 F	10 hours 8 hours	
145 F 155 F	7 hours 4 hours	

- Consume home-dried jerky within one to two months and commercially packaged jerky within 12 months.

The USDA currently recommends that meat be heated to 160 °F before the dehydrating process in order to destroy pathogenic microorganisms

For more information about food safety, visit the NDSU Extension Web site:

www.ag.ndsu.edu/ndsuaug/food

BEEF JERKY

1. Pre-freeze meat to be made into jerky so it will be easier to slice.
2. Cut partially thawed meat into long slices no more than ¼ inch thick. For tender jerky, cut at right angles to long muscles (across the grain). Remove as much visible fat as possible to help prevent off-flavors.
3. Prepare 2 to 3 cups of marinade of your choice in a large sauce pan.
4. Bring the marinade to a full rolling boil over medium heat. Add a few meat strips, making sure they are covered by the marinade. Reheat to full boil.
5. Remove pan from range. Using tongs, remove strips from hot marinade (work quickly to prevent overcooking) and place in single non-overlapping layers on drying racks. (Repeat steps 4 and 5 until all the meat has been pre-cooked.) Add more marinade if needed.
6. Dry at 140 to 150 F in dehydrator, oven, or smoker. Test for doneness by letting a piece cool. When cool, it should crack but not break when bent. There should not be any moist or underdone spots.
7. Refrigerate the jerky overnight in plastic freezer bags, then check again for doneness. If necessary, dry further.

C Soaking the strips in marinade before
A precooking is not advised as the
U marinade could become a source of
T bacteria. Putting unmarinated strips
I directly into the boiling marinade
O minimizes a cooked flavor and
N maintains the safety of the marinade.

Source: Oregon State University

HOT PICKLE CURE JERKY

Yield: 5 pounds of fresh meat should weigh approximately 2 pounds after drying or smoking.

1. Slice 5 lb. of meat (¼ inch thick strips) with the grain. Use lean meat free of fat and connective tissue.
2. Spread out meat and sprinkle on 3 Tbsp. salt, 2 tsp. ground black pepper, and 2 Tbsp. sugar. Put the meat in a pan or dish and let stand for 24 hours in the refrigerator.
3. Pound the meat on both sides to work in the spice. Optional: Dip strips of meat in a liquid smoke solution (5 parts water to 1 part liquid smoke) for one to two seconds for added flavor.
4. Make a brine by dissolving ¾ cup salt, ½ cup sugar, and 2 Tbsp. ground black pepper in a gallon of water. Stir to dissolve the salt and sugar.
5. Bring the brine to a low to medium boil. Immerse the fresh meat strips (a few at a time) into the boiling brine until they turn gray (one to two minutes). Remove meat from the brine, using clean tongs or other utensils that have not contacted raw meat.
6. Spread out meat on a clean dehydrator rack or on a clean rack in the top half of a kitchen oven. If you use a kitchen oven, open the oven door to the first or second stop. Heat at 120 to 150 F (lowest oven temperature) for 9 to 24 hours or until the desired dryness is reached.
7. Remove jerky from oven before it becomes too hard or brittle. Properly dried jerky should crack when bent in half but should not break into two pieces.
8. Store jerky in clean jars or plastic bags, or wrap it in freezer paper and freeze. If kept dry, properly prepared jerky will last almost indefinitely at any temperature, but its quality deteriorates after a few months.

Source: University of Wyoming

For more information on this and other topics, see: www.ag.ndsu.edu

This publication may be copied for noncommercial, educational purposes in its entirety with no changes. Requests to use any portion of the document (including text, graphics or photos) should be sent to NDSU.permission@ndsu.edu. Include exactly what is requested for use and how it will be used.

North Dakota State University does not discriminate on the basis of race, color, national origin, religion, sex, gender identity, disability, age, status as a U.S. veteran, sexual orientation, marital status, or public assistance status. Direct inquiries to the Vice President for Equity, Diversity and Global Outreach, 205 Old Main, (701) 231-7708.

County Commissions, NDSU and U.S. Department of Agriculture Cooperating.
This publication will be made available in alternative formats for people with disabilities upon request, (701) 231-7881.

1M-7-06; Web-5-10